CHAPTER 8

Understanding Inventory and Depreciation Concepts

OVERVIEW: THE INVENTORY CONCEPT

This overview concerns both the inventory concept and types of inventories.

Concept of Inventory in Healthcare Organizations

"Inventory" includes all the items (goods) that an organization has for sale in the normal course of its business. Inventory is an asset, owned by the company. It appears on the balance sheet as a current asset, because the individual items that compose the inventory are expected to be "used" (sold) within a 12 month period.

Types of Inventory in Healthcare Organizations

Various healthcare organizations (or departments within organizations) deal with inventory and must account for it. The hospital gift shop and the cafeteria, for example, own inventory and must account for it. All pharmacies (hospital-based, retail brick-and-mortar, or mail order pharmacies) own inventory in the normal course of their business.

In manufacturing companies, inventory typically consists of three parts: raw materials, work in progress, and the finished goods that are for sale. We might think that most inventory items for sale in a healthcare organization are not manufactured, but are finished goods instead. However, consider this example: the hospital cafeteria purchases flour, eggs, butter, and so on (raw materials), mixes the ingredients (work in progress), and produces a cake (finished goods) that is for sale. (Another example might be a pharmacy that compounds drugs.)

Progress Notes

After completing this chapter, you should be able to

1. Understand the interrelationship between inventory and cost of goods sold.
2. Understand the difference between LIFO and FIFO inventory methods.
3. Be able to calculate inventory turnover.
4. Understand the interrelationship between depreciation expense and the reserve for depreciation.
5. Understand how to compute the net book value of a fixed asset.
6. Be able to identify the five methods of computing book depreciation.

INVENTORY AND COST OF GOODS SOLD ("GOODS" SUCH AS DRUGS)

The interrelationship between inventory and cost of goods sold is at the heart of the inventory concept.

Turning Inventory into Cost of Goods (or Drugs) Sold

The completed inventory item ("finished goods") is sold. That is how an item moves out of inventory and is recognized as cost. When the item is recognized as cost, it becomes "cost of goods sold." (Also note that different terminology may be used. In some organizations cost of goods sold is called "cost of sales.") For a business such as a retail pharmacy, the cost of inventory sold to its customers is the largest single expense of the business.

Recording Inventory and Cost of Goods (or Drugs) Sold

Recording inventory and cost of goods (or drugs) sold is a sequence of events. **Figure 8–1** illustrates the sequence as follows:

- Beginning inventory (inventory at the start of the period) is recorded.
- Purchases during the period are recorded.
- Beginning inventory plus purchases equal "cost of goods available for sale."
- Ending inventory (inventory at the end of the period) is recorded.
- Cost of goods available for sale less ending inventory equals "cost of goods sold."

Purchases added to inventory will typically include "freight in," or the shipping costs to deliver the items to you. Any discounts received on the purchases should be subtracted from the purchase cost. Thus the purchases become "net purchases," that is, net of discounts. Sometimes the ending inventory is estimated. An example of "Estimating the Ending Pharmacy Inventory" is shown in the chapter about estimates and benchmarking.

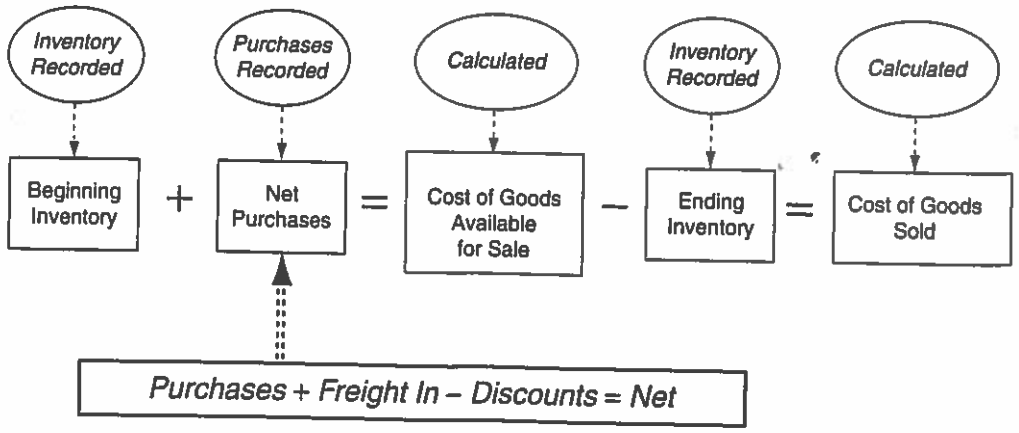


Figure 8–1 Recording Inventory in the Accounting Cycle.

Gross Margin Computation

Gross margin equals revenue from sales less the cost of goods sold. Gross margin is often expressed as a percentage. Thus, a pharmacy's gross margin might appear as follows:

Sales	100%
Cost of goods (drugs) sold	65% (–)
Gross margin	35%

An organization's gross margin percentage can be readily compared to industry standards.

INVENTORY METHODS

How is the inventory to be valued? The two most commonly used inventory valuation methods are First In, First Out (FIFO) and Last In, First Out (LIFO). The method chosen will affect the organization's financial statements, as explained in the following sections.

First-In, First-Out (FIFO) Inventory Method

The First In, First Out, or FIFO inventory costing method, recognizes the first costs placed into inventory as the first costs moved out into cost of goods sold when a sale occurs. How will this method affect the organization's financial statements? Under FIFO, the ending inventory figure will be higher (because when the oldest inventory moves out first, the ending inventory will be based on the costs of the latest purchases, which we assume will have cost more). **Exhibit 8–1** illustrates this effect.

Last-In, First-Out (LIFO) Inventory Method

The Last In, First Out, or LIFO inventory costing method, recognizes the latest, or last, costs placed into inventory as the first costs moved out into cost of goods sold when a sale occurs. How will this method affect the organization's financial statements? Under LIFO, the ending inventory figure will be lower (because when the latest inventory moves out first, the ending inventory will be based on costs of the earliest purchases, which we assume will have cost less). **Exhibit 8–2** illustrates this effect.

Other Inventory Treatments

Two other inventory treatments deserve mention, as follows.

Weighted Average Inventory Method

This inventory costing method is based on the weighted average cost of inventory during the period. (The weighted average inventory method is also called the average cost method.) The weighted average inventory cost is determined as follows: Divide the cost of goods available for sale by the number of drugs available for sale.

Exhibit 8–1 FIFO Inventory Effect

	Assumptions	FIFO Inventory Effect	
Sales (Revenue)	20 units @$25 =		$500
Cost of Sales:			
Beginning Inventory	10 units @$5 =	$50	
Plus: Purchases	10 units @$10 = $100 & 10 units @$15 = $150	250	
Subtotal		$300	
Less: Ending Inventory	10 units @$15 =	(150)	
Cost of Sales			150
Gross Profit			$350
Operating Expenses			(50)
Earnings Before Tax			$300
Income Tax			(90)
Earnings After Tax			$210

Note: Ending inventory computed as number of units in the beginning inventory plus number of units purchased less number of units sold–count oldest units sold first.

No Method: Inventory Never Recognized

This inventory costing method is no method at all. That is, inventory is never recognized. For example, a physician's office may expense all drug purchases as supplies at the time of purchase and never count such drugs as inventory. This treatment might be justified when such supplies were only a small part of the practice expenses. However, if the physician is purchasing very expensive drugs and administering them in the office (infusing expensive drugs is a good example), then not recognizing any such drugs being held as inventory on the financial statements is misleading.

INVENTORY TRACKING

The two most typical inventory tracking systems are described as follows.

Exhibit 8–2 LIFO Inventory Effect

	Assumptions	LIFO Inventory Effect	
Sales (Revenue)	20 units @$25 =		$500
Cost of Sales:			
Beginning Inventory	10 units @$5 =	$50	
Plus: Purchases	10 units @$10 = $100 & 10 units @$15 = $150	250	
Subtotal		$300	
Less: Ending Inventory	10 units @$5 =	(50)	
Cost of Sales			250
Gross Profit			$250
Operating Expenses			(50)
Earnings Before Tax			$200
Income Tax			(60)
Earnings After Tax			$140

Note: Ending inventory computed as number of units purchased plus number of units in the beginning inventory less number of units sold–count newest units sold first.

Perpetual Inventory System

With a perpetual inventory system the healthcare organization keeps a continuous, or perpetual, record for every individual inventory item. Thus the amount of inventory on hand can be determined at any time. (A real-time system is a variation of the perpetual inventory system, whereby transactions are entered simultaneously.)

A perpetual inventory system requires, of course, a specific identification method for each inventory item. Bar coding is often used for this purpose. You are most likely to find a perpetual inventory system in the pharmacy department of a hospital.

Periodic Inventory System

With a periodic inventory system the healthcare organization does not keep a continuous record that identifies every individual inventory item on hand. Instead, at the end of the

period the organization physically counts the inventory items on hand. Then costs per item are attached to the inventory counts in order to arrive at the cost of the inventory at the end of the period [redacted]

Necessary Adjustments

Certain inventory adjustments will commonly become necessary, as discussed here.

Shortages

When the periodic inventory results are compared to the inventory balance on the financial statements, it is not uncommon to find that the actual [redacted] amount is less than the amount recorded on the books. This difference, or shortage, is commonly termed [redacted] The inventory amount on the books must be reduced to the actual amount per the periodic inventory, and the resulting shrinkage cost must be recorded as an expense.

Obsolete Items

Most [redacted] will inevitably come to contain certain [redacted] For example, the pharmacy inventory will contain drugs that have "sell by" or "[redacted]" expiration dates. Obsolete inventory items should be discarded. Their cost must be removed from the cost of inventory on hand, and the resulting obsolescence cost must be recorded as an [redacted]

CALCULATING INVENTORY TURNOVER

Inventory turnover is a ratio that shows how fast inventory is sold, or [redacted] The computation is in two steps as follows. **Figure 8–2** illustrates the sequence.

Step 1. First compute [redacted]
Beginning Inventory plus Ending Inventory divided by two equals [redacted]

Step 2. Next compute "[redacted]"
Cost of Goods Sold (or [redacted]) divided by Average Inventory equals Inventory Turnover

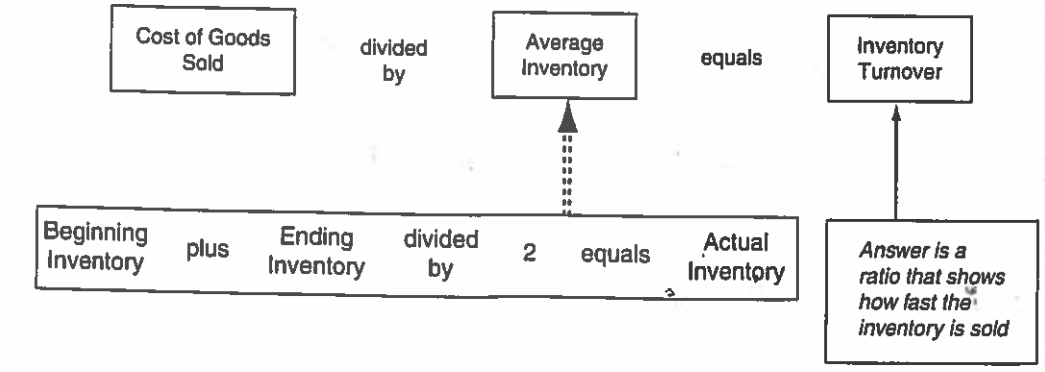


Figure 8–2 Calculating Inventory Turnover.

or example,

Step 1: $100,000 (beginning inventory) plus $150,000 (ending inventory) divided by 2 quals $125,000 (average inventory).

Step 2: $500,000 (cost of goods sold, or cost of sales) divided by $125,000 (average ventory) equals 4.0 (inventory turnover).

An organization's inventory turnover ratio can be readily compared to industry andards.

VERVIEW: THE DEPRECIATION CONCEPT

epreciation expense spreads, or allocates, the cost of a fixed asset over the useful life of at asset, as discussed here.

ixed Assets and Depreciation Expense

ixed assets, also known as long-term assets, are classified as long-term and placed on the alance sheet as such because they will not be converted into cash in the coming 12 months. he purchase of a fixed asset is a capital expenditure. (Capital expenditures involve the acuisition of assets that are long lasting, such as buildings and equipment.) "Capitalizing" eans recording these assets as long-term assets on the balance sheet.

We recognize the cost of owning buildings and equipment through depreciation exense. When the cost is spread, or allocated, over a period of years, each year's financial atements (for that period of years) recognize some portion of the cost, expressed as deeciation expense.

seful Life of the Asset

he useful life determines the period over which the fixed asset's cost will be spread. For ample, a piece of laboratory equipment is purchased for $20,000. It has a useful life of e years. So depreciation expense is recognized in each of the five years until the $20,000 used up.

alvage Value

efore depreciation expense can be calculated, we need to know whether the fixed asset ill have salvage value at the end of the depreciated period. Salvage value, also known as reidual value or scrap value, represents any expected cash value of the asset at the end of its seful life. If the laboratory equipment is expected to have a salvage value of $1,000 at the nd of its five-year useful life, then $19,000 will be spread over the five-year life as depreciaon expense, and the $1,000 will remain undepreciated at the end of that time.

OOK VALUE OF A FIXED ASSET AND THE RESERVE FOR DEPRECIATION

his section describes important interrelationships between and among depreciation exense, the reserve for depreciation, and net book value of an asset.

The Reserve for Depreciation

Depreciation expense over the years is accumulated into the reserve for depreciation. In other words, the reserve for depreciation holds the cumulative amount of depreciation expense that has been recognized over time, beginning with the date that the fixed asset was acquired. Another way to think about this is to view the reserve for depreciation as holding all the depreciation expense that has been recognized and recorded over the useful life of the asset.

Interrelationship of Depreciation Expense and the Reserve for Depreciation

Depreciation expense for the year is recorded in the income statement. At the same time, an equivalent amount is added to the cumulative amount that has been accumulating within the reserve for depreciation on the balance sheet. These amounts should balance each other; that is, if $25,000 is recognized as depreciation expense in the income statement, then $25,000 should be added to the reserve for depreciation on the balance sheet. This interrelationship is illustrated in **Figure 8–3**.

Net Book Value of a Fixed Asset

The net book value (also known as book value) of a fixed asset is a balance sheet figure that represents the remaining undepreciated portion of the fixed asset cost. The term derives from value recorded on the books—thus "book value."

The net book value of a fixed asset is computed as follows:

- Determine the original cost of the fixed asset on the balance sheet.
- Subtract the reserve for depreciation, which has accumulated depreciation expense as it has been recognized.
- The result equals net book value at that point in time (**Figure 8–4**).

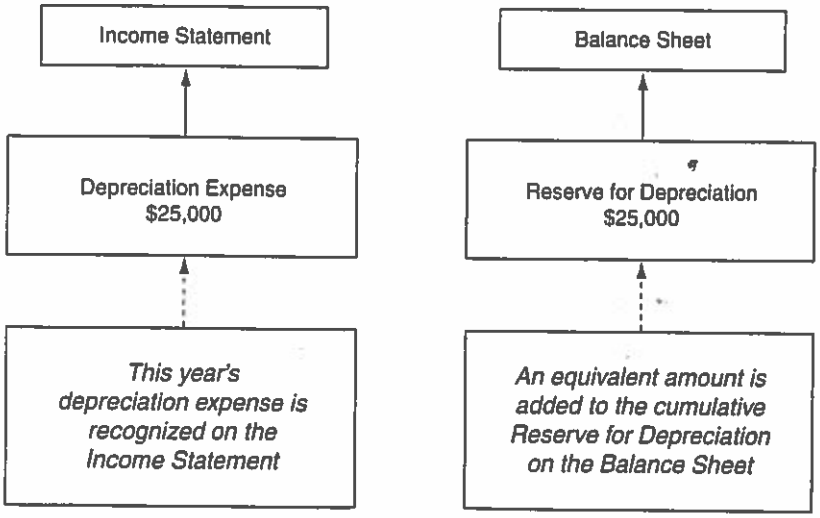
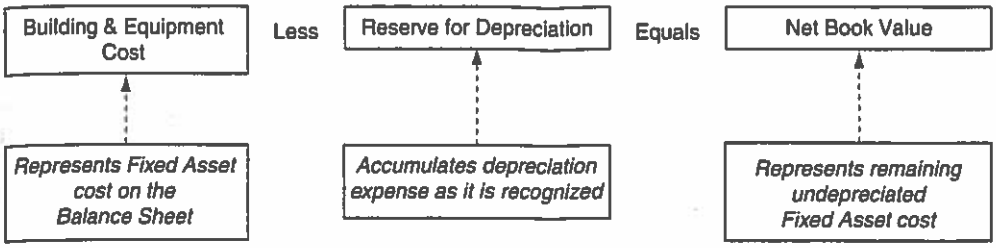


Figure 8–3 Interrelationship of Depreciation Expense and Reserve for Depreciation in the Accounting Cycle



gure 8–4 Net Book Value Computation.

lso note that fully depreciated fixed assets may still remain on the books if they are still ı use. A fully depreciated fixed asset, of course, means that the depreciable cost has been xhausted because all the depreciation expense over the asset's useful life has already been ecognized. Thus, the net book value would either be zero or would amount to the remain- ıg salvage value of the asset.

IVE METHODS OF COMPUTING BOOK DEPRECIATION

ıst as "book value" means value that is recorded on the organization's books, "book epreciation" means depreciation that is recorded on the books. Book depreciation is the epreciation expense recorded in the financial accounting records and reflected on the nancial statements. "Tax depreciation," on the other hand, is depreciation that is com- ıted for tax purposes and is reflected on the applicable tax returns of the organization. ax depreciation methods are discussed in the final section of this chapter.

You as a manager will most likely be using book depreciation in your planning, control, nd decision making. Five methods of computing book depreciation are described below.

traight-Line Depreciation Method

he straight-line depreciation method assigns an equal or even amount of depreciation xpense over each year (or period) of the asset's useful life. The expense is thus spread venly—or in a straight line—over the life of the asset. **Table 8–1** illustrates the straight-line epreciation method applied to a fixed asset costing $10,000 with a 5-year useful life and o salvage value. The depreciation expense would thus equal $2,000 for each of the 5 years $10,000 divided by 5 equals $2,000 per year).

Table 8–2 illustrates the straight-line depreciation method applied to a fixed asset cost- ıg $10,000 with a 5-year useful life and a $1,000 salvage value. The depreciation expense ould thus equal $1,800 for each year in this example, because we must leave $1,000 at the nd of the asset's 5-year life ($10,000 less $1,000 equals $9,000 divided by 5 equals $1,800 er year.)

If the asset was acquired in the second half of the year, in some cases only a half-year f depreciation will be recognized in Year 1. If this is the case, the remaining half-year of epreciation will be recognized in Year 6, in order to fully depreciate the asset.

Table 8–1 Straight-Line Depreciation: 5-Year Life with No Salvage Value

	Cost (to Be Depreciated)	Depreciation Expense per Year*	Accumulated Depreciation (Reserve for Depreciation)	Net Remaining Undepreciated Cost (Net Book Value)
	$10,000			
Year 1		$2,000	$2,000	$8,000
Year 2		2,000	4,000	6,000
Year 3		2,000	6,000	4,000
Year 4		2,000	8,000	2,000
Year 5		2,000	10,000	-0-

*$10,000 divided by 5 years = $2,000 per year.

Table 8–2 Straight-Line Depreciation: 5-Year Life with Salvage Value

	Cost (to Be Depreciated)	Depreciation Expense per Year*	Accumulated Depreciation (Reserve for Depreciation)	Net Remaining Undepreciated Cost (Net Book Value)
	$10,000			$10,000
Year 1		$1,800	$1,800	8,200
Year 2		1,800	3,600	6,400
Year 3		1,800	5,400	4,600
Year 4		1,800	7,200	2,800
Year 5		1,800	9,000	1,000**

*$9,000 divided by 5 years = $1,800 per year.
**Remaining salvage value.

Accelerated Book Depreciation Methods

As the name would imply, accelerated book depreciation methods write off more depreciation in the first part of the asset's useful life. Thus, they "accelerate" recognizing depreciation expense. Three accelerated depreciation methods are briefly described here. Further details about the computations for each method appear in Appendix 8-A at the end of this chapter.

Sum-of-the-Year's Digits (SYD) Method

The Sum-of-the-Year's Digits (SYD) accelerated depreciation method computes depreciation by multiplying the depreciable cost of the asset by a fraction.

Double-Declining Balance (DDB) Method

The Double-Declining Balance (DDB) accelerated depreciation method computes depreciation by multiplying the asset's net book value at the beginning of each year by a constant

percentage, or factor. In the case of DDB, the constant factor is twice the straight-line rate (thus "double-declining").

150% Declining Balance (150% DB) Method

The 150% Declining Balance (150% DB) accelerated depreciation method also computes depreciation by multiplying the asset's net book value at the beginning of each year by a constant percentage, or factor. In the case of 150% DB, however, the constant factor is half again or 150% of the straight-line rate.

Units of Service or Units of Production (UOP) Depreciation Method

The Units of Service or Units of Production (UOP) method computes depreciation by assigning a fixed amount of depreciation to each unit of service or output that is produced by equipment. "Units of Production" is a manufacturer's term for manufacturing, or producing, a product. "Units of Service" more properly describes the medical equipment providing services in healthcare organizations.

Instead of a useful life in years, equipment depreciated by the UOP method is assigned a fixed total amount of units of service. This fixed amount is the overall total for the life of the equipment. Then the number of units of service actually provided each year is depreciated.

COMPUTING TAX DEPRECIATION

The following discussion about tax depreciation is general in nature and is not to be utilized as tax advice. Any additional details about tax depreciation are beyond the scope of this text.

Overview

"Tax Depreciation," as previously defined, means depreciation that is computed for tax purposes and is reflected on the applicable tax returns of the organization. The methods of tax depreciation in effect at the time of this writing fall under the Modified Accelerated Cost Recovery System as described here.

Modified Accelerated Cost Recovery System (MACRS)

The Modified Accelerated Cost Recovery System (MACRS) is currently used to depreciate most business and investment property for tax purposes. MACRS presently consists of two depreciation systems, both of which are briefly described here.

General Depreciation System (GDS)

The General Depreciation System (GDS) is the method generally used under the U.S. Internal Revenue Service rules and regulations, although there are certain exceptions. GDS provides nine property classifications for useful life, including 3-, 5-, 7-, and 10-year property, and 15-, 20-, and 25-year property, along with residential rental property and nonresidential real property. For example, computers, calculators, and copiers fall into

the 5-year property classification while office furniture and fixtures such as desks, files, and safes fall into the 7-year property classification.[1]

The GDS method allows double-declining balance, 150% declining balance, and the straight-line method of depreciation, depending upon what type of property is being depreciated. For example, nonfarm 3-, 5-, 7-, and 10-year property can use any of the three methods in most (but not all) circumstances.[2]

Alternative Depreciation System (ADS)

The Alternative Depreciation System (ADS) is required for particular properties including, for example, any tax-exempt use property.[3] ADS uses fixed ADS recovery periods, along with straight-line depreciation. ADS can also be used for certain eligible property, even though the property in question could come under GDS (certain restrictions apply).[4]

The tax law changes rapidly; thus, modifications to the tax depreciation methods described in this section may have been placed into effect at any point in time. More information can be obtained from the recent Internal Revenue Service Publication 946 "How to Depreciate Property."

INFORMATION CHECKPOINT

What is needed?	A depreciation schedule that includes depreciation expense, reserve for depreciation, and net book value.
Where is it found?	With your supervisor or in the accounting and/or administration offices.
How is it used?	To reflect depreciation expense in order to complete the income statement.

KEY TERMS

Book Value
Depreciation
FIFO
Inventory
Inventory Turnover
LIFO
Salvage Value
Useful Life (of an asset)

DISCUSSION QUESTIONS

1. Do you or your supervisor have to deal with inventory? If so, please describe.
2. Have you ever had to count physical inventory? If so, please describe the process.
3. Do you or your supervisor have to deal with depreciation expense? If so, please describe.
4. Have you ever had to compute depreciation expense? If so, please describe the circumstances.

APPENDIX

A Further Discussion of Accelerated and Units of Service Depreciation Computations

8-A

CELERATED BOOK DEPRECIATION METHODS

the name would imply, accelerated book depreciation methods write off more depreciaı in the first part of the asset's useful life. Thus they "accelerate" recognizing depreciaı expense. The computations of three accelerated depreciation methods are described his appendix as follows.

n-of-the-Year's Digits (SYD) Method

Sum-of-the-Year's Digits (SYD) accelerated depreciation method computes depreciaı by multiplying the depreciable cost of the asset by a fraction. The fraction is the mechsm by which the acceleration is computed. It is calculated as follows:

- The numerator of the SYD fraction starts with the asset's useful life expressed in years and decreases by one each year thereafter. (Thus, for a 5-year useful life, the numerators are 5; 4; 3; 2; 1 respectively.)
- The denominator of the SYD fraction is the sum of the years' digits of the asset's life. (Thus, for a 5-year useful life, the sum of 5 + 4 + 3 + 2 + 1 equals 15, which is the denominator.)

Table 8-A–1 illustrates the computation for each year. The depreciable cost of $10,000 ivided by 15 to arrive at $666.66. Thus, one-fifteenth or $666.66 is multiplied by 5 for first year ($3,333 depreciation expense); by 4 for the second year ($2,667 depreciation ense), and so on.

uble-Declining Balance (DDB) Method

Double-Declining Balance (DDB) accelerated depreciation method computes depreon by multiplying the asset's net book value at the beginning of each year by a constant centage, or factor. In the case of DDB, the constant factor is twice the straight-line rate as "double-declining").

Table 8-A–2 illustrates the computation for each year of a 5-year useful life with no salvalue. The double-declining factor is computed as follows:

- $10,000 cost of the fixed asset divided by the asset's useful life of 5 years equals 20% or a factor of 0.20.
- Multiply the 0.20 by 2 (or double) to arrive at the 0.40 double-declining factor.

Table 8-A–1 Sum-of-the-Years' Digits Depreciation: 5-Year Life with No Salvage Value

		Depreciation Computation					
	Cost (to Be Depreciated)	*Depreciable Cost (for Computation)*	×	*Sum-of-the-Years' Digits* Fraction***	=	*Annual Depreciation Expense*	*Accumulated Depreciation (Reserve for Depreciation)*	*Net Remaining Undepreciated Cost (Net Book Value)*
	$10,000							
Year 1		$10,000		5/15		$3,333	$3,333	$6,667
Year 2		10,000		4/15		2,667	6,000	4,000
Year 3		10,000		3/15		2,000	8,000	2,000
Year 4		10,000		2/15		1,333	9,333	667
Year 5		10,000		1/15		667	10,000	-0-

*Sum-of-the-Years' Digits = 15 = (1 + 2 + 3 + 4 + 5).
**One-fifteenth of $10,000 = $666.66.

Table 8-A–2 Double-Declining Balance Depreciation: 5-Year Life with No Salvage Value

		Depreciation Computation				
	Cost (to Be Depreciated)	*Carry-forward Book Value (for Computation)*	× *Double Declining Balance Factor*	= *Annual Depreciation Expense*	*Accumulated Depreciation (Reserve for Depreciation)*	*Net Remaining Undepreciated Cost (Net Book Value)*
	$10,000					
Year 1		$10,000	0.40*	$4,000	$4,000	$6,000
Year 2		6,000	0.40	2,400	6,400	3,600
Year 3		3,600	0.40	1,440	7,840	2,160
Year 4		2,160	S/L**	1,080	8,920	1,080
Year 5		1,296	S/L	1,080	10,000	-0-

*$10,000 divided by 5 years equals 0.20 times 2 (double) equals 0.40 factor.
**Double-Declining Balance changes to straight-line method when straight-line yields a higher depreciation. (See Table 8-A–3.)

The computation continues as follows:

- For Year 1, $10,000 times 0.40 equals $4,000 Year 1 depreciation expense. Accumulated depreciation for Year 1 also equals $4,000. The accumulated depreciation of $4,000 is subtracted from the $10,000 cost to arrive at the net remaining undepreciated cost, or net book value, of $6,000 at the end of Year 1.
- For Year 2, the factor of 0.40 is multiplied times the $6,000 net book value to equal $2,400 Year 2 depreciation expense. The Year 2 depreciation of $2,400 is added to the accumulated depreciation for a total of $6,400 ($4,000 plus $2,400 equals $6,400). The $6,400 is subtracted from the $10,000 cost to arrive at the net remaining undepreciated cost, or net book value, of $3,600 at the end of Year 2.
- For Year 3, the factor of 0.40 is multiplied times the $3,600 net book value to equal $1,440 Year 3 depreciation expense. The Year 3 depreciation of $1,440 is added to the accumulated depreciation for a total of $7,840 ($6,400 plus $1,440 equals $7,840). The $7,840 is subtracted from the $10,000 cost to arrive at the net remaining undepreciated cost, or net book value, of $2,160 at the end of Year 3.

The declining-balance method has a peculiarity in that it switches back to the straight-line method at the point where the straight-line computation yields a higher annual depreciation than does the declining-balance computation. Thus, as we arrive at Year 4 in this example, we must test the double-declining computation against the straight-line computation.

- To compute Year 4 double-declining, the factor of 0.40 is multiplied times the net book value of $2,160 to arrive at a DDB of $864.
- To compute a comparative Year 4 by the straight-line method, the remaining net book value of $2,160 is divided by the remaining years of useful life, which in this case would be 2 years. Thus $2,160 divided by 2 years equals straight-line depreciation per year for Year 4 and for Year 5 of $1,080 per year.
- The Year 4 straight-line method is greater ($1,080) than the Year 4 DDB ($864). Thus the switch to straight line is made for the remaining Year 4 and Year 5, as illustrated in Table 8-A–2.

The point at which the straight-line method overtakes the declining-balance method varies, of course, with the method and with the number of years of useful life. **Table 8-A–3** illustrates the first year for which the straight-line depreciation method gives an equal or greater deduction. (Note that the 5-year Property Class [or Useful Life Class] for 200% declining balance [or double-declining balance] shows the fourth year as the point at which the switch to straight line would be made. This is consistent with our example in Table 8-A–2.)

150% Declining Balance Method

The 150% Declining Balance (150% DB) accelerated depreciation method also computes depreciation by multiplying the asset's net book value at the beginning of each year by a constant percentage, or factor. In the case of 150% DB, however, the constant factor is half again or 150% of the straight-line rate.

Table 8-A–3 Declining Balance Rates by Property Class

Property Class	*Method*	*Declining Balance Rate*	*Year**
3-year	200% DB	66.667%	3rd
5-year	200% DB	40.000%	4th
7-year	200% DB	28.571%	5th
10-year	200% DB	20.00%	7th
15-year	150% DB	10.0	7th
20-year	150% DB	7.5	9th

*Indicates the first year for which the straight-line depreciation method gives an equal or greater deduction.
Reproduced from Internal Revenue Service, Publication 946, "How to Depreciate Property," p. 43.

Table 8-A–4 illustrates the computation for each year of a 5-year useful life with no salvage value. The 150% DB factor is computed as follows:

- $10,000 cost of the fixed asset divided by the asset's useful life of 5 years equals 20% or a factor of 0.20.
- Multiply the 0.20 by 150% (or half again) to arrive at the 0.30 150% DB factor.

The 150% DB computation follows the same pattern as the double-declining example just described, with two exceptions:

- The factor applied is 0.30 per year, as just explained.
- The 150% DB switches to straight line in Year 3 instead of Year 4 as in the previous example.

Units of Service or Units of Production (UOP) Depreciation Method

The Units of Service or Units of Production (UOP) method computes depreciation by assigning a fixed amount of depreciation to each unit of service or output that is produced by equipment. The "Units of Production" is a manufacturer's term for manufacturing, or producing, a product. "Units of Service" more properly describes the medical equipment providing services in healthcare organizations.

Instead of a useful life in years, equipment depreciated by the UOP method is assigned a fixed total amount of units of service. This fixed amount is the overall total for the life of the equipment. Then the number of units of service actually provided each year is depreciated.

Table 8-A–5 illustrates the UOP method. The depreciation per unit of service is computed as follows:

- The total depreciable units of service over 5 years are determined to be 5,000 units. The equipment cost to be depreciated of $10,000 is divided by 5,000 units to arrive at depreciation of $2.00 per unit.
- Units of Service in Year 1 total 1,000. Thus 1,000 units times $2.00 per unit equals $2,000 Year 1 depreciation.

Table 8-A–4 150% Declining Balance Depreciation: 5-Year Life with No Salvage Value

		Depreciation Computation					
	Cost (to Be Depreciated)	*Carry-Forward Book Value (for Computation)*	×	*150% Declining Balance Factor*	= *Annual Depreciation Expense*	*Accumulated Depreciation (Reserve for Depreciation)*	*Net Remaining Undepreciated Cost (Net Book Value)*
	$10,000						
Year 1		$10,000		0.30*	$3,000	$3,000	$7,000
Year 2		7,000		0.30	2,100	5,100	4,900
Year 3		4,900		S/L**	1,663	6,733	3,267
Year 4		3,267		S/L	1,633	8,366	1,634
Year 5		1,634		S/L	1,634	10,000	-0-

*$10,000 divided by 5 years equals 0.20 times half again (150%) equals 0.30 factor.
**150% Declining Balance changes to straight-line method when straight-line yields a higher depreciation.

Table 8-A–5 Units of Service (Units of Production) Depreciation: 5-Years of Service with No Salvage Value

		Depreciation Computation					
	Cost (to Be Depreciated)	*Units of Service per Year*	×	*Depreciation per Unit*	=	*Annual Depreciation Expense*	*Accumulated Depreciation (Reserve for Depreciation)*	*Net Remaining Undepreciated Cost (Net Book Value)*
	$10,000							
Year 1		$1,000		$2.00*		$2,000	$2,000	$8,000
Year 2		900		2.00		1,800	3,800	6,200
Year 3		800		2.00		1,600	5,400	4,600
Year 4		1,100		2.00		2,200	7,600	2,400
Year 5		1,200		2.00		2,400	10,000	-0-
	Total Units	5,000						

*$10,000 divided by total units (5,000) equals depreciation per unit of $2.00.

- Units of Service in Year 2 total 900. Thus 900 units times $2.00 per unit equals $1,800 Year 2 depreciation.

The computation continues in this manner until the total 5,000 units of service are exhausted. The equipment is then fully depreciated.

CHAPTER

Staffing: The Manager's Responsibility

9

STAFFING REQUIREMENTS

In most businesses, a position is filled if the employee works five days a week, generally Monday through Friday. But in health care, many positions must be filled, or covered, all seven days of the week. Furthermore, in most businesses, a position is filled for that day if the employee works an eight-hour day—from 9:00 to 5:00, for example. But in health care, many positions must also be filled, or covered, 24 hours a day. The patients need care on Saturday and Sunday, as well as Monday through Friday, and patients need care around the clock, 24 hours a day.

Thus, healthcare employees work in shifts. The shifts are often eight-hour shifts, because three such shifts times eight hours apiece equals 24-hour coverage. Some facilities have gone to 12-hour shifts. In their case, two 12-hour shifts equal 24-hour coverage. The manager is responsible for seeing that an employee is present and working for each position and for every shift required for that position. Therefore, it is necessary to understand and use the staffing measurement known as the full-time equivalent (FTE). Two different approaches are used to compute FTEs: the annualizing method and the scheduled-position method. Full-time equivalent is a measure to express the equivalent of an employee (annualized) or a position (staffed) for the full time required. We examine both methods in this chapter.

FTEs FOR ANNUALIZING POSITIONS

Why Annualize?

Annualizing is necessary because each employee that is eligible for benefits (such as vacation days) will not be on duty for the full number of hours paid for by the

Progress Notes

After completing this chapter, you should be able to

1. Understand the difference between productive time and nonproductive time.
2. Understand computing full-time equivalents to annualize staff positions.
3. Understand computing full-time equivalents to fill a scheduled position.
4. Tie cost to staffing.

organization. Annualizing thus allows the full cost of the position to be computed through a burden approach. In the burden approach, the net hours desired are inflated, or burdened, in order to arrive at the gross number of paid hours that will be needed to obtain the desired number of net hours on duty from the employee.

Productive Versus Nonproductive Time

Productive time actually equates to the employee's net hours on duty when performing the functions in his or her job description. Nonproductive time is paid-for time when the employee is not on duty: that is, not producing and therefore "nonproductive." Paid-for vacation days, holidays, personal leave days, and/or sick days are all nonproductive time.

Exhibit 9–1 illustrates productive time (net days when on duty) versus nonproductive time (additional days paid for but not worked). In Exhibit 9–1, Bob, the security guard, is

Exhibit 9–1 Metropolis Clinic Security Guard Staffing

The Metropolis laboratory area has its own security guard from 8:30 AM to 4:30 PM seven days per week. Bob, the security guard for the clinic area, is a full-time Metropolis employee.

He works as follows:

1.	The area assigned to Bob is covered seven days per week for every week of the year. Therefore,		
	Total days in business year	364	
2.	Bob doesn't work on weekends (2 days per week × 52 weeks = 104 days)	(104)	
	Bob's paid days total per year amount to (5 days per week × 52 weeks = 260 days)	260	
3.	During the year Bob gets paid for:		
	Holidays	9	
	Sick days	7	
	Vacation days	7	
	Education days	2	
		(25)	
4.	Net paid days Bob actually works		235

Jim, a police officer, works part time as a security guard for the Metropolis laboratory area. Jim works on the days when Bob is off, as follows:

Weekends	104		
Bob's holidays	9		
Bob's sick days	7		
Bob's vacation days	7		
Bob's education days	2		
		129	
5. Paid days Jim works			129
6. Total days lab area security guard position is covered			364

paid for 260 days per year (total paid days) but works for only 235 days per year. The 235 days are productive time, and the remaining 25 days of holidays, sick days, vacation days, and education days are nonproductive time.

FTE for Annualizing Positions Defined

For purposes of annualizing positions, the definition of FTE is as follows: the equivalent of one full-time employee paid for one year, including both productive and nonproductive (vacation, sick, holiday, education, etc.) time. Two employees each working half-time for one year would be the same as one FTE.

Staffing Calculations to Annualize Positions

Exhibit 9–2 contains a two-step process to perform the staffing calculation by the annualizing method. The first step computes the net paid days worked. In this step, the number of paid days per year is first arrived at; then paid days not worked are deducted to arrive at net paid days worked. The second step of the staffing calculation converts

Exhibit 9–2 Basic Calculation for Annualizing Master Staffing Plan

Step 1: How Many Net Paid Days Are Worked?

(a) A *business year* has 364 days.

(b) In this example the employee works five days per week. The other two days off are not paid for. Thus two days off per week times 52 weeks equals 104 *non-paid days.*

(c) Therefore the number of *paid days per year* equals 364 less 104, or 260 days.

(d) But not all paid days per year are worked. In this example each employee (RN, LPN, & Nurse Assistant [NA]) receives 35 *personal leave days.* (The personal leave days are intended to include holidays, sick leave, and vacation days.)

(e) In addition these employees are entitled to *continuing professional education (CPE) days.* These are also paid days not worked, as follows: RNs = 5 days; LPNs = 3 days; NAs = 2 days.

(f) Therefore the *net paid days worked* are as follows:

RN = 260 days (35) (5) = 220
LPN = 260 days (35) (3) = 222
NA = 260 days (35) (3) = 223

Step 2: How Are Net Paid Days Worked Converted to a Factor?
The factor is calculated by dividing total days in the business year (364) by the net paid days worked, as follows:

RN = 364/220 = 1.6545
LPN = 364/222 = 1.6396
NA = 364/223 = 1.6323

Courtesy of J.J. Baker and R.W. Baker, Dallas, Texas.

Exhibit 9–3 Master Staffing Plan for Nursing Unit

8-Hour Shifts	RNs	LPNs	NAs
Day Shift	3	1	6
Evening Shift	2	2	5
Night Shift	1	2	2
24-Hour Total	6	5	13

Courtesy of J.J. Baker and R.W. Baker, Dallas, Texas.

the net paid days worked to a factor. In the example in Exhibit 9–2, the factor averages out to about 1.6.

This calculation is for a 24-hour around-the-clock staffing schedule. Thus, the 364 in the step 2 formula equates to a 24-hour staffing expectation. **Exhibit 9–3** illustrates such a master staffing plan.

NUMBER OF EMPLOYEES REQUIRED TO FILL A POSITION: ANOTHER WAY TO CALCULATE FTEs

Why Calculate by Position?

The calculation of number of FTEs by the scheduled-position method—in other words, to fill a position—is used in controlling, planning, and decision making. **Exhibit 9–4** sets out the schedule and the FTE computation. A summarized explanation of the calculation in Exhibit 9–4 is as follows. One full-time employee (as shown) works 40 hours per week. One 8-hour shift per day times 7 days per week equals 56 hours on duty. Therefore, to cover 7 days per week, or 56 hours, requires 1.4 times a 40-hour employee (56 hours divided by 40 hours equals 1.4), or 1.4 FTEs.

Exhibit 9–4 Staffing Requirements Example

Emergency Department Scheduling for 8-Hour Shifts:

	Shift 1 Day	Shift 2 Evening	Shift 3 Night	=	24-Hour Scheduling Total
Position: Emergency Room Intake	1	1	1	=	3 8-hour shifts
To Cover Position 7 Days per Week Equals FTEs of:	1.4	1.4	1.4	=	4.2 FTEs

One full-time employee works 40 hours per week. One 8-hour shift per day times 7 days per week equals 56 hours on duty. Therefore, to cover 7 days per week or 56 hours requires 1.4 times a 40-hour employee (56 hours divided by 40 hours equals 1.4), or 1.4 FTEs.

Staffing Calculations to Fill Scheduled Positions

The term "staffing," as used here, means the assigning of staff to fill scheduled positions. The staffing measure used to compute coverage is also called the FTE. It measures what proportion of one single full-time employee is required to equate the hours required (i.e., full-time equivalent) for a particular position. For example, the cast room has to be staffed 24 hours a day, 7 days a week because it supports the emergency room and therefore has to provide service at any time. In this example, the employees are paid for an 8-hour shift. The three shifts required to fill the position for 24 hours are called the day shift (7:00 AM to 3:00 PM), the evening shift (3:00 PM to 11:00 PM), and the night shift (11:00 PM to 7:00 AM).

One 8-hour shift times 5 days per week equals a 40-hour work week. One 40-hour work week times 52 weeks equals a person-year of 2,080 hours. Therefore, one person-year of 2,080 hours equals a full-time position filled for one full year. This measure is our baseline.

It takes seven days to fill the day shift cast room position from Monday through Sunday, as required. Seven days is 140% of five days (seven divided by five equals 140%), or, expressed another way, is 1.4. The FTE for the day shift cast room position is 1.4. If a seven-day schedule is required, the FTE will be 1.4.

This method of computing FTEs uses a basic 40-hour work week (or a 37-hour work week, or whatever is the case in the particular institution). The method computes a figure that will be necessary to fill the position for the desired length of time, measuring this figure against the standard basic work week. For example, if the standard work week is 40 hours and a receptionist position is to be filled for just 20 hours per week, then the FTE for that position would be 0.5 FTE (20 hours to fill the position divided by a 40-hour standard work week). **Table 9–1** illustrates the difference between a standard work year at 40 hours per week and a standard work year at 37.5 hours per week.

Table 9–1 Calculations to Staff the Operating Room

Job Position	*No. of FTEs*	*No. of Annual Hours Paid at 2,080 Hours**	*No. of Annual Hours Paid at 1,950 Hours***
Supervisor	2.2	4,576	4,290
Techs	3.0	6,240	5,850
RNs	7.7	16,016	15,015
LPNs	1.2	2,496	2,340
Aides, orderlies	1.0	2,080	1,950
Clerical	1.2	2,496	2,340
Totals	16.3	33,904	31,785

*40 hours per week × 52 weeks = 2,080.
**37.5 hours per week × 52 weeks = 1,950.

TYING COST TO STAFFING

In the case of the annualizing method, the factor of 1.6 already has this organization's vacation, holiday, sick pay, and other nonproductive days accounted for in the formula (review Exhibit 9–2 to check out this fact). Therefore, this factor is multiplied times the base hourly rate (the net rate) paid to compute cost.

In the case of the scheduled-position method, however, the FTE figure of 1.4 will be multiplied times a burdened hourly rate. The burden on the hourly rate reflects the vacation, holiday, sick pay, and other nonproductive days accounted for in the formula (review Exhibit 9–4 to see the difference). The scheduled-position method is often used in the forecasting of new programs and services.

Actual cost is attached to staffing in the books and records through a subsidiary journal and a basic transaction record (both discussed in a preceding chapter). **Exhibit 9–5** illustrates a subsidiary journal in which employee hours worked for a one-week period are recorded. Both regular and overtime hours are noted. The hourly rate, base pay, and overtime premiums are noted, and gross earnings are computed. Deductions are noted and deducted from gross earnings to compute the net pay for each employee in the final column.

Exhibit 9–6 illustrates a time card for one employee for a week-long period. This type of record, whether it is generated by a time clock or an electronic entry, is the original record upon which the payroll process is based. Thus, it is considered a basic transaction record. In this example, time in and time out are recorded daily. The resulting regular and overtime hours are recorded separately for each day worked. Although the appearance of the time card may vary, and it may be recorded within a computer instead of on a hard copy, the essential transaction is the same: this recording of daily time is where the payroll process begins.

Exhibit 9–7 represents an emergency department staffing report. Actual productive time is shown in columns 1 and 2, with regular time in column 1 and overtime in column 2. Nonproductive time is shown in column 3, and columns 1, 2, and 3 are totaled to arrive at column 4, labeled "Total [actual] Hours." The final actual figure is the FTE figure in column 5.

The report is biweekly and thus is for a 2-week period. The standard work week amounts to 40 hours, so the biweekly standard work period amounts to 80 hours. Note the first line item, which is for the manager of the emergency department nursing service. The actual hours worked in column 4 amount to 80, and the actual FTE figure in column 5 is 1.0. We can tell from this line item that the second method of computing FTEs—the FTE computation to fill scheduled positions—has been used in this case. Columns 7 through 9 report budgeted time and FTEs, and columns 10 through 12 report the variance in actual from budget. The budget and variance portions of this report structure will be more thoroughly discussed in the chapter about operating budgets.

In summary, hours worked and pay rates are essential ingredients of staffing plans, budgets, and forecasts. Appropriate staffing is the responsibility of the manager.

Exhibit 9–5 Example of a Payroll Register

Metropolis Health System
Payroll Register

Week Ended June 10, ____

Employee No.	*Name*	*Hours Worked*			*Rate*	*Base Pay*	*Overtime Premiums*	*Gross Earnings*	*Deductions*						*Net Pay*
		Regular	*Overtime*	*Total*					*Federal Income Tax*	*Social Security*	*Medicare Tax*				
1071	J.F. Green	40	2	42	14.00	588.00	14.00	602.00	90.30	37.32	8.73				465.65
1084	C.B. Brown	40		40	14.00	560.00		560.00	84.00	34.72	8.62				432.66
1090	K.D. Grey	40		40	10.00	400.00		400.00	60.00	24.80	6.16				309.04
1092	R.N. Black	40	5	45	10.00	450.00	25.00	475.00	71.25	29.45	6.89				367.41

Courtesy of Resource Group, Ltd., Dallas, Texas.

Exhibit 9–6 Example of a Time Record

Metropolis Health System
Time Card

Employee J.F. Green No. 1071

Department 3 Week ending June 10

Day	Regular				Overtime		Hours	
	In	*Out*	*In*	*Out*	*In*	*Out*	*Regular*	*Overtime*
Monday	8:00	12:01	1:02	5:04			8	
Tuesday	7:56	12:00	12:59	5:03	6:00	8:00	8	2
Wednesday	7:57	12:02	12:58	5:00			8	
Thursday	8:00	12:00	1:00	5:01			8	
Friday	7:59	12:01	1:01	5:02			8	
Saturday								
Sunday								
						Total regular hours	40	
						Total overtime		2

Courtesy of Resource Group, Ltd., Dallas, Texas.

PR 2301

Biweekly Comparative Hours Report
for the Payroll Period Ending Sept. 20, ____

Dept. No. 3421
Emergency Room

		Actual					Budget				Variance		
		Productive											
	Job Code	Regular Time (1)	Overtime (2)	Non-Productive (3)	Total Hours (4)	FTEs (5)	Productive (6)	Non-Productive (7)	Total Hours (8)	FTEs (9)	Number Hours (10)	Number FTEs (11)	Percent (12)
Mgr Nursing Service	11075	80	0	0	80	1.0	69.8	10.2	80	1	0	0	0
Supv Charge Nurse	11403	383.2	0.1	79	462.3	5.8	456	64	520	6.5	57.7	0.7	11.1%
Medical Assistant	12007	6.2	0	0	6.2	0.1	0	0	0	0	–6.2	–0.1	100.0%
Staff RN	13401	2010.5	32.8	285.8	2329.1	29.1	2012.8	240.8	2253.6	28.2	–75.5	–0.9	–3.4%
Relief Charge Nurse	13403	81.9	4.3	0	86.2	1.1	0	0	0	0	–86.2	–1.1	100.0%
Orderly/Transporter	15483	203.8	38	20	261.8	3.3	279.8	35.3	315.1	3.9	53.3	0.6	16.9%
ER Tech	22483	244.6	27.5	67.9	340	4.3	336.2	34.5	370.7	4.6	30.7	0.3	8.3%
Secretary	22730	58.1	0	0	58.1	0.7	50.5	5.9	56.4	0.7	–1.7	0.0	–3.0%
Unit Coordinator	22780	555.1	35.6	74.9	665.6	8.3	505.4	53.8	559.2	7	–106.4	–1.3	–19.0%
Preadmission Testing Clerk	22818	0	6.5	0	6.5	0.1	0	0	0	0	–6.5	–0.1	100.0%
Patient Registrar	22873	617.5	78.6	105.7	801.8	10.0	718.2	57.8	776	9.7	–25.8	–0.3	–3.3%
Lead Patient Registrar	22874	0	0	0	0	0.0	73.8	6.2	80	1	80.0	1.0	100.0%
Patient Registrar (weekend)	22876	36.7	0	0	36.7	0.5	0	0	0	0	–36.7	–0.5	100.0%
Overtime	29998	0	0	0	0	0.0	38.5	0	38.5	0.5	38.5	0.5	100.0%
Department Totals		4277.6	223.4	633.3	5134.3	64.3	4541	508.5	5049.5	63.1	–84.8	–1.2	0.0

Courtesy of Resource Group, Ltd., Dallas, Texas.

INFORMATION CHECKPOINT

What is needed?	The original record of time and the subsidiary journal summary.
Where is it found?	The original record can be found at any check-in point; the subsidiary journal summary can be found with a supervisor in charge of staffing for a unit, division, and so on.
How is it used?	It is reviewed as historical evidence of results achieved. It is also reviewed by managers seeking to perform future staffing in an efficient manner.

KEY TERMS

Full-Time Equivalents (FTEs)
Nonproductive Time
Productive Time
Staffing

DISCUSSION QUESTIONS

1. Are you or your immediate supervisor responsible for staffing?
2. If so, do you use a computerized program?
3. Do you believe a computerized program is better? If so, why?
4. Does your organization report time as "productive" and "nonproductive"?
5. If not, do you believe it should? What do you believe the benefits would be?

NOTE

1. J. J. Baker, *Prospective Payment for Long-Term Care: An Annual Guide* (Gaithersburg, MD: Aspen Publishers, Inc., 1999).